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10/736,007	12/15/2003	Christopher Laurent Beaudry	8034 USA L/W-C/W-C/JB1	2960

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EXAMINER

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1765

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Please find below and/or attached an Office communication concerning this application or proceeding.



## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-5, 12, 15, 19, 51, 54, 57 are rejected under 35 U.S.C. 102(e) as being anticipated by Boyers (US 2003/0051742).

Boyers describes a method for treating a substrate comprising: dispensing a liquid onto a topside of a horizontally spinning 300 mm wafer from a single dispense centered approximately over the wafer (fig. 1; paragraph [0014]) with a spinning rate of 1000-4000 rpm and a flow rate of 2.7 L/min (this combination would be above a curved defined by the 3 set points cited in claim 1) (paragraph [0020]); dispersing the rinse liquid (claimed second liquid) wherein the wafer spin is from 2000-4000 rpm concurrently a portion of the cycle (paragraph [0026], tables 1, 2). This would read on claimed maintaining the spin and flow rate of the first liquid while dispersing the second liquid.

Referring to claims 2 and 3, the method cleans photoresist, post ash photoresist residue, post-etch residue, and other organic materials from the semiconductor wafers (paragraph [0007]). The topside of these wafers would be either hydrophobic.

Referring to claims 12, 15, the liquid includes etch and rinse solutions and they are dispensed concurrently a portion of the cycle (paragraph [0026]). This would read on claimed

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stopping the dispense of the 1<sup>st</sup> liquid while continue dispensing the second liquid. Referring to claim 23, this would result in changing the etch solution's pH to a second pH since it is mixed with the rinse. Since the wafer is spinning during the whole time at about the same rate (table 1) the wafer would have a first, second, and third spin rate for the transition from the etch, etch/rinse, and rinse solutions. Also the same spin rate would also minimize the turbulence in the liquid layer.

Referring to claim 19, the liquid further comprises of surfactant (paragraph [0028]).

Referring to claim 51, the etch/clean solution has a first concentration of etchants and capable of etching at a first etch rate producing a first amount of etch products (paragraph [0022], table 1); by adding DI water, which would have a second concentration of etchants, it would modify the etch/cleaning solution, which would has a second lower etch rate than the first etch rate since the etch/cleaning solution is diluted (or claimed water dilute the first cleaning solution). This would also change the pH (claimed pH transition) of the cleaning solution. Since the liquid is used to etch/clean the wafer, the cleaning solution would has a second amount of etch products to prevent the formation of particle defects on the wafer surface (paragraph [0026]).

Referring to claims 54, 57 the mixture of etch/cleaning and DI water would read on claimed second solution and it would have a concentration of etchants lower than the first concentration since it is diluted with DI water.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 6, 7, 13, 14, 20, 22, 52, 53, 55, 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boyers.

Referring to claims 6, 7, 20, Boyers doesn't describe the flow rate and the spin rate as that of the claims and the pH at 9-10. However, his flow rate and spin rate of the liquid would include those of the claimed rates (table 1). One skilled in the art would find it obvious to determine the flow and spin rate, and the pH through routine experimentation because Boyers teaches that different spin rate can be chosen for different portions of the processing cycle and the other process conditions outside the presented ranges can be used for different applications and wafer configurations (paragraphs [0013, 0023]).

Referring to claims 13, 14, 52, 53, 55, 56, the time to dispense the second liquid and the first liquid concurrently, the second etch rate, and the concentration of the etchants of the second solution would be obvious to be determined through routine experimentation in order to provide optimum transition time, concentration, and etch rate to clean the wafer with a reasonable expectation of success.

5. Claims 8, 17, 18, 21, 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boyers as applied to claims 1, 20, and 51 above, and further in view of Zhang et al. (US 2004/0029395).

Unlike claimed invention, Boyers doesn't describe the liquid is a modified SC-1 cleaning solution comprising  $\text{NH}_4\text{OH}$ ,  $\text{H}_2\text{O}_2$ , water, a chelating agent, and a surfactant. Zhang teaches a cleaning solution comprising  $\text{NH}_4\text{OH}$ ,  $\text{H}_2\text{O}_2$ , water, a chelating agent, and a surfactant, and

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ozone (paragraph [0042]). It would have been obvious for one skilled in the art to modify Boyers' solution in light of Zhang because Zhang teaches that his solution would remove particulates that may lead to defects through dispersion (paragraphs [0028,0029]).

6. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boyers as applied to claim 12 above, and further in view of admitted prior art.

Referring to claim 16, it is known to one skilled in the art to further applying a HF solution preceding the cleaning. Therefore, one skilled in the art would find it obvious to modify Boyers to apply HF solution in order to etch or remove the oxide (page 2 of the specification).

7. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boyers as applied to claim 1 above, and further in view of Farber et al. (US 2001/0047810).

Referring to claim 9, Boyers is silent about dispensing the liquid in a sweeping dispense toward an edge of the wafer. Farber describes a method for cleaning a wafer wherein the liquid is dispensed in a sweeping dispense from the center toward an edge of the wafer (paragraph [0020]). It would have been obvious for one skilled in the art to modify Boyers' method in light of Farber's teaching because sweeping dispense from the center toward the edge of the wafer would distribute the cleaning solution more evenly through out the wafer.

Referring to claims 10 and 11, as the process comes to an end, the wafer spin rate would decrease. This would occur simultaneously to the dispensing of the liquid in the sweeping dispense as it also comes to a stop.

***Allowable Subject Matter***

8. Claims 23-25, 27, 28, 32-36 are allowed since the allowable subject matter of claim 26 has been added to its independent claim 23.

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Claims 59-62 remain allowed.

Claims 37-50 remain allowed.

Claims 63-65 are allowed since it includes the allowable subject matter of claim 29.

***Claim Rejections - 35 USC § 112***

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation “maintaining a combination...liquid flow rate that is above a...while dispensing a second liquid” is vague because it is not clear what this liquid flow rate is referring to the first or second liquid. At this time, it will be understood as the first liquid flow rate.

***Response to Arguments***

11. Applicant's arguments filed 1/18/06 have been fully considered but they are not persuasive.

Applicant's argument that Boyers doesn't disclose maintaining a combination of the spin and flow rate of the first liquid while dispersing the second liquid is found unpersuasive because he describes that the second liquid can be dispersed concurrently with the first liquid and since he doesn't teach that the combination of the spin and flow rate of the first liquid changing when adding the second liquid, the combination would be the same while adding or dispersing the second liquid.

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Applicant's argument that adding rinsing and etching liquid at the same time may dilute the etch solution but it is not the same as dispersing a second solution having a second concentration to dilute a first solution is found unpersuasive. Adding of the etching and rinsing liquid would also include claimed adding the second solution or rinse liquid, which would have a second concentration, and therefore it would dilute the first solution or the etching solution.

***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n. Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6 am -2:30 pm.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Primary Examiner  
Duy-Vu N. Deo  
4/3/06

